

Evolution of mobile phone technology

[Technology](#), [Mobile Phone](#)



Consumer demand was strong despite the battery life, weight, and low talk time, and waiting lists were in the thousands. In 1991, the second generation (2G) cellular technology was launched in Finland by Radiomobility on the GSM standard, which sparked competition in the sector as the new operators challenged the incumbent GIG network operators. Ten years later, in 2001, the third generation (3G) was launched in Japan by NTT DoCoMo on the WCDMA standard. By 2009, it had become clear that, at some point, 3G networks would be overwhelmed by the growth of bandwidth-intensive applications like streaming media.

Consequently, the industry began looking to data-optimized 4th- generation technologies, with the promise of speed improvements up to 10-fold over existing 3G technologies. The first two commercially available technologies billed as 4G were the LTE standard (offered in the U. S. By Sprint) and the WiMAX standard, first offered in Scandinavia by Telenor. Handheld mobile phone Prior to 1973, mobile telephony was limited to phones installed in cars and other vehicles. [13] Motorola and Bell Labs raced to be the first to produce a handheld mobile phone.

That race ended on 3 April 1973 when Martin Cooper, a Motorola researcher and executive, made the first mobile telephone call from handheld subscriber equipment, placing a call to Dr. Joel S. Engel of Bell Labs. The prototype handheld phone used by Dr. Cooper weighed 2.5 pounds and measured 9 inches long, 5 inches deep and 1.75 inches wide. The prototype offered a talk time of just 30 minutes and took 10 hours to re-charge. John F. Mitchell, Motorola's chief of portable communication products and Cooper's

boss in 1973, played a key role in advancing the development of handheld mobile telephone equipment.

Mitchell successfully pushed Motorola to develop wireless communication products that would be small enough to use anywhere and participated in the design of the cellular phone. Analog cellular networks - GIG The first analog cellular system widely deployed in North America was the Advanced Mobile Phone System (AMPS). It was commercially introduced in the Americas in 1978, Israel in 1986, and Australia in 1987. AMPS was a pioneering technology that helped drive mass market usage of cellular technology, but it had several serious issues by modern standards.

It was unencrypted and easily vulnerable to eavesdropping via a scanner; it was susceptible to cell phone "cloning;" Many of the iconic early commercial cell phones such as the Motorola Dynasty Analog AMPS are eventually superseded by Digital AMPS (D-AMPS) in 1990, and AMPS service was shut down by most North American carriers by 2008. Digital cellular networks - G In the sass, the 'second generation' mobile phone systems emerged. Two systems standard and the U. S. Developed CDMA standard. These differed from the previous generation by using digital instead of analog transmission, and also fast out-of-band phone-to-network signaling.

The rise in mobile phone usage as a result of 2G was explosive and this era also saw the advent of prepaid mobile phones. In 1991 the first GSM network (Radiological) launched in Finland. In general the frequencies used by 2G systems in Europe were higher than those in America, though with some

overlap. For example, the 900 MHz frequency range was used for both 1G and 2G systems in Europe, so the 1G systems were rapidly closed down to make space for the 2G systems. In America the IS-54 standard was deployed in the same band as AMPS and displaced some of the existing analog channels.

In 1993, IBM Simon was introduced. This was possibly the world's first smartphone. It was a mobile phone, pager, fax machine, and PDA all rolled into one. It included a calendar, address book, clock, calculator, notepad, email, and a touch screen with a QWERTY keyboard. The IBM Simon had a stylus you used to tap the touch screen with. It featured predictive typing that would guess the next characters as you tapped. It had APS, or at least a way to deliver more features by plugging a PCMCIA 1.8 MB memory card into the phone.

Coinciding with the introduction of 2G systems was a trend away from the larger "brick" phones toward tiny 100-gram hand-held devices. This change was possible not only through technological improvements such as more advanced batteries and more energy-efficient electronics, but also because of the higher density of cell sites to accommodate increasing usage. The latter meant that the average distance transmission from phone to the base station shortened, leading to increased battery life whilst on the move. The second generation introduced a new variant of communication called SMS or text messaging.

It was initially available only on GSM networks but spread eventually on all digital networks. The first machine-generated SMS message was sent in the I-J on 3 December 1992 followed in 1993 by the first person-to-person SMS sent in Finland. The advent of prepaid services in the late sass soon made SMS the communication method of choice amongst the young, a trend which spread across all ages. 26 also introduced the ability to access media content on mobile phones. In 1998 the first downloaded content sold to mobile phones was the ring tone, launched by Fenland's Radiological (now Elise).

Advertising on the mobile phone first appeared in Finland when a free daily SMS news headline service was launched in 2000, sponsored by advertising. Mobile payments were trialed in 1998 in Finland and Sweden where a mobile phone was used to pay for a Coca Cola vending machine and car parking. Commercial launches followed in 1999 in Norway. The first commercial payment system to mimic banks and credit cards was launched in the Philippines in 1999 simultaneously by mobile operators Globe and Smart. The first full internet service on mobile phones was introduced by NOT Dotcom in Japan in 1999.

Mobile broadband data - G As the use of 26 phones became more widespread and people began to utilize mobile phones in their daily lives, it became clear that demand for data services (such as access to the internet) was growing. Furthermore, experience from fixed roadman services showed there would also be an ever increasing demand for greater data speeds. The 26 technology was nowhere near up to the Job, so the technological

difference that distinguishes 3G technology from 2G technology is the use of packet switching rather than circuit switching for data transmission.

In addition, the standardization process focused on requirements more than technology (2.45 Gbit/s maximum data rate indoors, 384 kbit/s outdoors, for example). Inevitably this led to many competing standards with different contenders pushing their own technologies, and the vision of a single unified worldwide standard looked far from lethality. The standard 2G CDMA networks became 3G compliant with the adoption of Revision A to EV-DO, which made several additions to the protocol whilst retaining backwards compatibility: * the introduction of several new forward link data rates that increase the maximum burst rate from 2.45 Gbit/s to 3.1 Gbit/s. * protocols that would decrease connection establishment time. * the ability for more than one mobile to share the same time slot. * the introduction of soft flags. All these were put in place to allow for low latency, low bit rate communications such as VoIP. The first pre-commercial trial network with 3G was launched by NTT DoCoMo in Japan in the Tokyo region in May 2001. NTT DoCoMo launched the first commercial 3G network on 1 October 2001, using the WIGWAM technology. In 2002 the first 3G networks on the rival ACADÉMIA EV-DO technology were launched by SK Telecom and KT in South Korea, and Monet in the USA.

Monet has since gone bankrupt. By the end of 2002, the second WIGWAM network was launched in Japan by Au K (now Softbank). European launches of 3G were in Italy and the UK by the Three/ Hutchison group, on WIGWAM. 2003 saw a further 8 commercial launches of 3G, six more on

WIGWAM and two more on the EVE-DO standard. In the mid sass (decade), an evolution of 3G technology begun to be implemented, namely High-Speed Downlink Packet Access (HSDPA). It is an enhanced 3G (third generation) mobile telephony communications protocol in the High-Speed Packet Access (HSPA) family, also coined 3.6G, 3G+ or turbo 3G, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data transfer speeds and capacity. Current HSDPA deployments support down-link speeds of 1.8, 3.6, 7.2 and 14.0 Mbit/s. Further speed increases are available with HSPA+, which provides speeds of up to 42 Mbit/s downlink and 84 Mbit/s with Release 9 of the 3GPP standards. By the end of 2007, there were 295 million subscribers on 3G networks worldwide, which reflected 9% of the total worldwide subscriber base.

About two thirds of these were on the WIGWAM standard and one third on the EVE-DO standard. The 3G telecoms services generated over 120 Billion dollars of revenues during 2007 and at many markets the majority of new phones activated were 3G phones. In Japan and South Korea the market no longer supplies phones of the second generation. Although mobile phones had long had the ability to access data networks such as the Internet, it was not until the widespread availability of good quality 3G coverage in the mid-sass (decade) that specialized devices appeared to access the mobile internet.

The first such devices, known as "dongles", plugged directly into a computer through the USB port. Another new class of device appeared subsequently, the so-called "compact wireless router" such as the Innovate Mifi, which

makes 3G internet connectivity available to multiple computers simultaneously over Wi-Fi, rather than just to a single computer via a USB plug-in. Such devices became especially popular. Consequently, some computer manufacturers started to embed the mobile data function directly into the laptop so a dongle or MiFi wasn't needed.

Instead, the SIM card could be inserted directly into the device itself to access the mobile data services. Such G-capable laptops became commonly known as "notebook". Other types of data-aware devices followed in the notebook's footsteps. By the beginning of 2010, E-readers, such as the Amazon Kindle and the Nook from Barnes & Noble, had already become available with embedded wireless internet, and Apple Computer had announced plans for embedded wireless internet on its iPad tablet devices beginning that Fall.

Native IP networks - 4G By 2009, it had become clear that, at some point, 3G networks would be overwhelmed by the growth of bandwidth-intensive applications like streaming media. Consequently, the industry began looking to data-optimized 4th-generation technologies, with the promise of speed improvements up to 10-fold over existing 3G technologies. The first two commercially available technologies billed as 4G were the LTE standard (offered in the U. S. By Sprint) and the LTE standard, first offered in Scandinavia by Telenor.